REMARKS

Claims 1 and 3-10 are presently pending in the application.

The specification has been amended to correct several typographical errors in the abstract, as requested by the Examiner. Accordingly, withdrawal of the objection to the specification is respectfully requested.

Claim 2 has been canceled. Claim 1 has been amended to recite that the purity of the compound represented by formula (I) is 97% or higher, which is supported in the specification at least at page 11, line 11 and in the working examples. Claim 1 also recites that the compound contains less than 3% by mass of a compound having formula (II), which is supported in the specification at least at page 12, seventh to fourth lines from the bottom. Further, new claim 9 has been added, which recites that a concentration of diphenyl sulfoxide in the compound represented by formula (I) is less than 0.05% by mass, which is supported in the application at least at page 13, lines 10-11. Finally, new claim 10, which recites that the photoinitiator for cationic polymerization contains substantially no compound having formula (II), is supported in the specification at least at page 13, lines 1-3. No new matter has been added by these amendments, and entry is respectfully requested.

Rejections Under § 102(b)/§ 103(a) Based on Schulthess

In the Office Action, the Examiner has rejected claims 1-6 under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,783,358 of Schulthess ("Schulthess") or under 35 U.S.C. § 103(a) as being obvious over Schulthess in view of WO 02/24101 of Date et al. ("WO '101"), using U.S. Patent Application Publication No. 2004/0030158 as an English equivalent.

Regarding claims 1-4, the Examiner argues that Schulthess discloses a composition which contains at least one compound which can be cured by means of free radicals and a suitable free-radical polymerization photoinitiator, as well as cationically curable components: a cationically polymerizable compound and a photoinitiator for cationic polymerization. The Examiner further argues that Schulthess specifically discloses a composition for

stereolithography based on epoxy resins as cationically polymerizable compounds, a sulfonium salt of formula (1) as a photoinitiator for cationic polymerization, and further constituents which can be polymerized by means of free radicals (hybrid system). The Examiner argues that the compound of formula (1) is the same compound as claimed when M is an antimony atom, and takes the position that in the absence of evidence to the contrary, the photoinitiator for cationic polymerization of Schulthess has a purity of 100%.

In the alternative, the Examiner argues that it would have been obvious to one skilled in the art at the time of the invention to use the sulfonium salts with a purity of 96% obtained in the process of WO '101 as photocationic polymerization initiators in the composition of Schulthess since WO '101 specifically indicates this use for such high-purity salts. Regarding claims 5 and 6, the Examiner argues that Schulthess further discloses that the cationically polymerizable compound can be an epoxy resin having on average more than one 1,2-epoxide group in the molecule and that the compounds which allegedly can be polymerized by means of free radicals include monoacrylates, diacrylates, and polyacrylates having acrylate functionalities of up to nine, or the corresponding methacrylates. Applicants respectfully traverse these rejections as follows.

The claimed actinic radiation-curable resin composition for stereolithography includes a cationic polymerizable organic compound, a radical polymerizable organic compound, a photo initiator for radical polymerization and a photo initiator for cationic polymerization which contains a highly pure (97 weight % or higher) compound represented by formula (I) and less than 3% by mass of a compound represented by formula (II). This compound is highly pure to improve the aging stability during operation and the storage stability of the composition. Applicants have determined that the stability of the composition may be dramatically improved by increasing the ratio of compound having formula (I) to compound having formula (II), that is, preferably substantially excluding compounds of formula (II).

Schulthess discloses a sulfonium salt of formula (I) as a cationic polymerization photo initiator (Example 1) and the Examiner takes the position that, without evidence to the contrary, this sulfonium salt has a purity of 100%. In order to evaluate if the Examiner's assertion is correct, Applicants have performed an additional experiment, which is described in the Declaration of Tsuneo Hagiwara Under 37 C.F.R. 1.132, submitted herewith ("Hagiwara

Declaration"). As described in the Hagiwara Declaration, Applicants analyzed "CIBTOOL™ SL 5180," used in Example 1 of Schulthess. This analysis confirms that "CIBTOOL™ SL 5180" contains "UVI 6974," a cationic polymerization photo initiator, in an amount of about 2-3% (see paragraph 12 and Table A attached to Hagiwara Declaration).

As shown in row "E" of Table A and the Material Safety Data Sheet (MSDS) attached to the Hagiwara Declaration, UVI 6974 is a mixture of a monosulfonium salt, corresponding to a compound of formula (I) of the present application, and a bissulfonium salt, corresponding to a compound of formula (II) of the present application (see paragraphs 13-14 of Hagiwara Declaration). It is further apparent from page 2 of the MSDS for UVI 6974 that the concentration purity of the monosulfonium salt is not high and is less than or equal to 50 weight %. Accordingly, since Shulthess utilizes "CIBTOOL™ SL 5180," which contains 2-3% UVI 6974, and since UVI 6974 contains at most 50% of a sulfonium salt having formula (I), Example 1 of Schulthess does not disclose a cationic polymerization photo initiator including a highly-pure compound represented by formula (I) of the present application.

There is also no teaching or suggestion in Schulthess of a compound of the claimed high purity and containing less than 3 mass % of a compound represented by formula (II). In fact, it is known that compositions for stereolithography which use UVI 6974 as polymerization photoinitiators have poor stability. In order to improve the stability of such compositions, Schulthess includes an ion exchanger and does not suggest decreasing the concentration of a compound having formula (II) and/or increasing the ratio of compound (I) to compound (II). Therefore, Schulthess does not teach or suggest all of the claimed elements and thus does not anticipate the claims. Reconsideration and withdrawal of the § 102(b) rejection are respectfully requested.

The Examiner argues that it would have been obvious to utilize the sulfonium salt of WO '101 in the composition of Schulthess. However, as acknowledged by the Examiner, WO '101 discloses a sulfonium salt with a purity of 96%, but not 97% or higher as claimed. Further, WO '101 does not teach or suggest that a highly pure compound represented by formula (I) improves the stability of a composition for stereolithography. Accordingly, there would have been no motivation to utilize the "pure" compound of WO '101 in the composition of Schulthess and thus no *prima facie* case of obviousness has been established. Furthermore, it would not have been

expected based on the proposed combination of Schulthess and WO '101 that utilization of a particularly pure sulfonium compound improves aging and storage stabilities of the resulting resin composition, as in the presently claimed composition. Such unexpected results and the criticality of the purity of the compound having formula (I) are described in the present application and summarized in paragraphs 9-11 of the Hagiwara Declaration. Accordingly, reconsideration and withdrawal of the § 103(a) rejection based on Schulthess in view of WO '101 are respectfully requested.

Rejections Under § 102(e)/§ 103(a) Based on Steinmann

The Examiner has also rejected claims 1-8 under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent Application Publication No. 2004/0137368 of Steinmann ("Steinmann") or under 35 U.S.C. § 103(a) as being obvious over Steinman in view of WO '101. The Examiner argues that Steinmann discloses a radiation-curable composition, useful for the production of three dimensional articles by stereolithography, which comprises: (A) at least one cationically polymerizing organic substance; (B) at least one free-radical polymerizing organic substance; (C) at least one cationic polymerization initiator; and (D) at least one free radical polymerization initiator. Steinmann allegedly discloses that the cationic polymerization initiator may be UVI 6974 from Union Carbide, which the Examiner contends contains (4-phenylthiophenyl)diphenylsulfonium hexafluoroantimonate, allegedly the claimed compound of formula (I) when M is antimony. The Examiner takes the position that in the absence of a record to the contrary, the cationic polymerization initiator of Steinmann has a purity of 100%. In the alternative, the Examiner takes the position that it would have been obvious to use sulfonium salts with a purity of 96% obtained in the process of WO '101 as photocationic polymerization initiators in the composition of Steinmann since WO '101 allegedly indicates this use for the high purity sulfonium salts.

The Examiner further argues that Steinmann discloses that the cationically polymerizable compound may be an epoxy cresol novolac or epoxy phenol novolac compound which possesses more than one epoxide group in the molecule, that the free radically curable component preferably comprises at least one poly(meth)acrylate, such as di-, tri-, tetra-, or

pentafunctional monomeric or oligomeric aliphatic, cycloaliphatic or aromatic acrylates or methacrylates, and that the radiation curable composition further comprises at least one hydroxyl-functional oxetane compound (F). Finally, Steinmann allegedly discloses in Example 1 that 3-ethyl-3-hydroxymethyl-oxetane (Cyracure UVR 6000) is contained in the radiation-curable composition at a ratio of 26.78 weight % with respect to the 3,4-epoxycyclohexylmethyl-3',4'-epoxycyclohexane carboxylate (Cyracure UVR 6110), and that glycerine propoxylated polyether triol (Voranol CP 450) is contained in the composition at a ratio of 17.85% with respect to the Cyracure UVR 6110. Applicants respectfully traverse these rejections as follows.

Steinmann teaches a radiation-curable composition which may contain UVI 6974 as a preferred cationic polymerization initiator (Steinmann paragraph [0076]). As discussed above, Applicants have empirically determined that the purity of the sulfonium compound of Formula (I) in UVI 6974 is up to 50%, not 97% or higher as claimed. As also previously explained, WO '101 only teaches a purity of 96%. Accordingly, Steinmann or the proposed combination of Steinmann and WO '101 would not teach or suggest a sulfonium compound of Formula (I) having a 97% or higher purity as claimed and containing less than 3 % by mass of a compound having formula (II). Therefore, reconsideration and withdrawal of the § 102(e) and § 103(a) rejections based on Steinmann are respectfully requested.

In view of the preceding Amendments, Remarks, and Hagiwara Declaration, it is respectfully submitted that the pending claims are patentably distinct from the prior art of record and in condition for allowance. A Notice of Allowance is respectfully requested.

Respectfully submitted,

Takashi Ito, et al.

November 27, 2007
(Date)

By: /for Hagiwara, Reg. No. 25,918/
for **SANDRA M. KATZ**
Registration No. 51,864
AKIN GUMP STRAUSS HAUER & FELD LLP
One Commerce Square
2005 Market Street, Suite 2200
Philadelphia, PA 19103-7013
Telephone: 215-965-1200

Direct Dial: 215-965-1344
Facsimile: 215-965-1210
SMK/smk E-Mail: skatz@akingump.com

Encl: Petition for Extension of Time (two-months), Declaration of Tsuneo Hagiwara Under 37 C.F.R. 1.132